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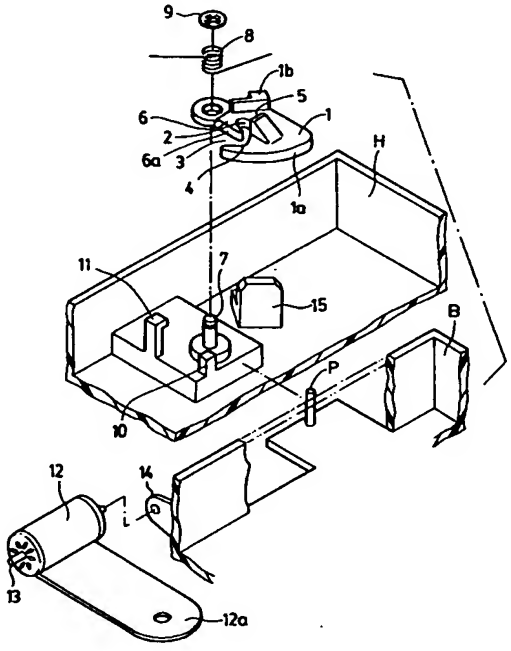
(54) Storage device with safety function.

(57) A storage device includes a cam member (1) rotatably disposed on a housing (H) side, a pin member (P) disposed on a storage cabinet (B) side, a lock part (4) and a guide outlet (5) formed so as to be mutually separated on one edge side defining a cam groove (2) of the cam member, and a stopper guide wall (6) integrally formed on the other edge side opposite to the one edge so as to project between the lock part and the guide outlet. The lock part fulfills the role of fastening the pin member positioned outside of the stopper guide wall so that the storage cabinet will be locked at the shut position thereof inside the housing against the biasing force of a spring (12) by the joint action of the cam member and the pin member and so that the storage cabinet will be enabled by farther depression of the storage cabinet into the housing to be automatically moved in the opening direction thereof from the opening of the housing. The stoage device is allowed to manifest a safety function for coping with the impact exerted on the rear side of an automobile carrying the storage device as well as on the front side thereof by a regulating wall (15) within the housing at a position capable of limiting the amount of rotation of the cam member when the cam member happens to rotate in the direction of releasing the pin member, by providing the cam member with an adjusting part (16) for causing the center of gravity of the cam member and the axis of rotation of the cam member to coincide with each other, or by making the cam member thicker at the lock part other than the remaining part of the cam member.

FIG.7



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This invention relates to a so-called push-open type storage devise to be installed as in the instrument panel of an automobile, and more particularly to a storage devise with a safety function.

Generally, conventional push-open type storage devices of this type comprise a storage cabinet openably supported in a housing which is provided on the side of the instrument panel of an automobile and constantly kept biased in the opening direction thereof by the biasing force of a spring, a cam member provided therein with a cam groove which has a guide inlet, a lock part and a guide outlet, and rotatably disposed on the side of the housing, and a pin member adapted to move inside the cam groove of the cam member and disposed on the side of the storage cabinet, whereby the storage cabinet can be locked at its shut position inside the housing against the biasing force of the spring by causing the pin member to be engaged with the lock part of the cam groove and, by causing the storage cabinet held in the locked state to be depressed farther into the housing, the pin member can be released from the engagement with the lock part of the cam groove and the storage cabinet can be consequently moved automatically in the opening direction thereof from the opening of the housing.

A typical one of the conventional storage devices is as shown in Figures 1 and 2, wherein a cam member 21 which is a one-piece shaped article of synthetic resin is rotatably fitted on a fixing shaft 27 on the side of a housing (not shown) through a torsion spring 28 and is constantly kept biased by the biasing force of the torsion spring 28 in the direction of a regulating wall 29 until it succumbs to the control of the regulating wall part 29. In the specific construction of this cam member 21, a lock part 24 and a guide outlet 25 are formed in extreme proximity to each other on one edge side of the cam member 21 defining a cam groove 22 and, meanwhile, a guide wall 26 adapted to guide a pin member P on the side of a storage cabinet (not shown) is formed as projecting from the other edge side opposite to the one edge side mentioned above.

Since the cam member 21 has been developed for the sole purpose of guiding the pin member P exclusively in the direction of the guide outlet 25 by the action of an inner edge 26a of the guide wall 26, the leading end of the guide wall 26 is formed so as to protrude from the lock part 24, namely in a state thrusting in the direction of a guide inlet 23 of the cam groove 22, and the lock part 24 serving to engage the pin member P in place is positioned inside of the leading end of the guide wall 26.

When the storage cabinet is depressed into the housing, therefore, the pin member P disposed on the rear end side of the storage cabinet collides with an outer peripheral guide surface 21a of the cam member 21 and, while rotating the cam member 21 in the direction opposite the direction in which this cam member 21 is biased by the torsion spring 28, eventually reaches the guide inlet 23 of the cam groove 22. When the pin member P collides with the outer edge of the guide wall 26, the cam member 21 is rotated to a certain extent this time in the direction in which the cam member 21 is biased by the torsion spring 28. As a result, the pin member P is guided into the cam groove 22. At this time, since the storage cabinet is retracted by the iasing force of the spring 28, the pin member P automatically engages itself with the lock part 24 positioned inside of the cam groove 22 as illustrated in Figure 1 and causes the storage cabinet to be infallibly locked against the biasing force of the spring 28 at the shut position in the housing.

When the storage cabinet held in the locked state is farther depressed into the housing, the pin member P separates from the lock part 24 of the cam groove 22 as illustrated in Figure 2, collides with an inner edge 26a of the guide wall 26, and allows the cam member 21 to rotate further in the biasing direction (the unlocking direction). When the force of depressing the storage cabinet is subsequently ceased, the pin member P is automatically separated from the cam groove 22 of the cam member 21 as continuously guided in the direction of the guide outlet 25 of the cam groove 22. As a result, the storage cabinet is enabled by the spring biasing force to move automatically from the opening of the housing in the opening direction.

When a large inertial force generated by an automobile with the storage device, in consequence of encountering a collision or applying brakes suddenly to avoid an accident, is exerted on the storage cabinet which is locked at its shut position by the engagement of the pin member P with the lock part 24, the storage cabinet moves in the direction in which the inertial force is exerted. At this time, the pin member P synchronously separates from the lock part 24 disposed inside in the same manner as during the opening operation shown in Figure 2 and allows the cam member 21 to rotate in the unlocking direction. Thus, the possibility ensues that the storage cabinet will be moved accidentally from the opening of the housing automatically in the opening direction by the spring biasing force and consequently suffered to do harm to the operator or occupant of the automobile.

To preclude the occurrence of such bad situation, therefore, the present inventor has already proposed a storage devise furnished with a safety function in EPC Application No. 93100552.4.

Besides the basic construction of the conventional device described above as a prerequisite, the proposed storage device has a construction as illustrated in Figure 3(A) in which a lock part 34 and a guide outlet 35 are formed as separated by a fair interval on one edge side defining a cam groove 32 of a cam member 31, a stopper guide wall 36 is formed as projecting between the lock part 34 and the guide outlet 35 on the other edge side opposite to the aforementioned one edge side, and the lock part 34 discharging the function of engaging the pin member P in place is consequently allowed to be positioned farther out from the stopper guide wall 36.

In the normal use of the proposed storage device constructed as described above, therefore, when the storage cabinet is depressed into the housing, the pin member P disposed on the side of the storage cabinet collides with an outer peripheral guide surface 31a of the cam member 31 and, while simultaneously rotating the cam member 31 in a direction opposite to the direction in which the cam member 31 is biased by the torsion spring 28, eventually reaches a guide inlet 33, fastens on the lock part 34 of the cam groove 32 and enables the storage cabinet to be locked at its shut position inside the housing against the spring biasing force as illustrated in Figure 3(A) in much the same manner as in the conventional storage device. When the storage cabinet as held in the locked state is further depressed into the housing, the pin member P separates from the lock part 34 of the cam groove 32 and allows the cam member 31 to be rotated in the unlocking direction as shown in Figure 3(B). As a result, the storage cabinet is enabled to be moved automatically from the opening of the housing in the opening direction by virtue of the spring biasing force.

When the propsoed storage devise having the storage cabinetheld in the locked state at its shut position is exposed to a large inertial force G generated when an automobile carrying the proposed storage device encounters a collision or applies brakes suddenly to avoid an accident, the result is basically that the storage cabinet moves in concert with the pin member P in the same direction as that of the inertial force G. Since the lock part 34 fulfilling the role of fastening the pin member P is positioned outside of the stopper guide wall 36 at this time, the pin member P collides with an outer edge 36a of the stopper guide wall 36 as shown in Figure 4 and is infallibly obstructed from moving in the direction of the guiding outlet 35 of the cam groove 32. As a result, the cam member 31 is no longer allowed to rotate in the unlocking direction thereof and the storage cabinet is retained at its shut position inside the housing. Owing to the safety function, the storage cabinet can be prevented from being accidentally moved automatically from the opening of the housing in the opening direction thereof by the spring biasing force. Therefore, the proposed storage device is at an advantage in promising generous simplification and miniaturization of the devise as a whole because the slight modification given to the cam member 31 can easily confer a safety function on the push-open type storage device. It has been ascertained to the present inventor, however, that a further exaltation of the safety function calls for further improvements in the following points.

When the safety function is manifested, the construction of the proposed storage device described above suffices to cope with the inertial force G of normally predictable magnitude. When an inertial force GI having an unimaginably large magnitude or an inertial force G2 in an oblique direction acts on the storage device as illustrated in Figure 5, for example, since the center of gravity of the cam member 31 exists on the leading end side owing to the overall construction of the storage device, the possibility arises that the cam member 31 will overrun in a large measure in the direction opposite to the biasing direction of the torsion spring 28 (the direction indicated by the solid arrow in Figure 5) and the pin member P will separate from the guide inlet 33 of the cam groove 32.

When the storage cabinet is locked in its shut position inside the housing, it is natural that the pin member P on the side of the storage cabinet should fasten on the lock part 34 of the cam groove 32 as already described. In this case, when the automobile carrying the storage devise has some other vehicle collide therewith from behind or the automobile in the process of moving back collides with an obstacle, the resultant strong impact impels the housing and the automobile body forward and meanwhile causes the storage cabinet openably supported inside the housing to remain fast in its own position as aided by the spring biasing force. As a result, there arises the same phenomenon of separation as is encountered when the housing and the storage cabinet are moved away from each other.

Once this phenomenon of mutual separation occurs, a very large load is exerted to bear particularly on the lock part 34 of the cam groove 32 fulfilling the role of fastening the pin member P in place and, as a result, the lock part 34 or the neighboring part is readily broken possibly to the extent of disrupting the usability of the storage device, with the wall thickness of the lock part 34 as a contributory factor. Even if the lock part 34 escapes being broken by the impact, the load mentioned above causes the pin member P to tilt easily and consequently enables the leading end of the cam member 31 to slip upward as indicated by

an imaginary line in Figure 6. As a result, the possibility ensues that the pin member P will readily separate from the lock part 34 of the cam member 31 and the storage cabinet B will move out accidentally from the opening of the housing H owing to the spring biasing force in the same manner as described above.

The present invention has been proposed to provide a storage devise with a safety function and for use in an automobile, which is capable of effectively precluding the occurrence of such an undesirable phenomenon as described above.

According to the present invention, there is provided a storage device with a safety function and for use in an automobile, comprising a storage cabinet openably supported in a housing having an opening; a spring provided between the storage cabinet and the housing for constantly biasing the storage cabinet in an opening direction thereof; a cam member rotatably disposed on the side of the housing and provided on an outside thereof with a guide surface and on an inside thereof with a cam groove which has a guide inlet, a lock part and a guide outlet; and a pin member disposed on the side of the storage cabinet for moving along the guide surface of the cam member, entering the guide inlet of the cam groove and engaging with the lock part of the cam groove to lock the storage cabinet at a shut position thereof inside the housing against the biasing force of the spring when a first depressing force is applied to the storage cabinet and for moving inside the cam groove to be released from the engagement with the lock part of the cam groove and brought to the guide outlet of the cam groove, therey moving the storage cabinet automatically in the opening direction thereof through the opening of the housing when a second depressing force is applied for moving the locked storage cabinet further into the housing; the lock part and the guide outlet of the cam groove being separated from each other on one edge side of the cam member defining the cam groove; the other edge side of the cam member opposite to the one edge side being provided integrally with a projecting stopper guide wall at a position between the lock part and the guide outlet of the cam groove so that the lock part of the cam groove is positioned outwardly from the stopper guide wall of the cam groove; whereby the pin member is enabled to collide with an outer edge of the stopper guide wall of the cam member and prevent the storage cabinet from being thrust out of the housing when the storage devise is exposed to a large inertial force; the storage device being characterized in that a regulating wall is provided within the housing at a position capable of limiting the amount of rotation of the cam member when the cam member happens to rotate from the guide inlet of the cam groove in the direction of releasing the pin member, or in that the cam member has an adjusting part for causing the center of gravity of the cam member and the axis of rotation of the cam member to coincide with each other, or in that the cam member is thicker at the lock part other than the remaining part of the cam member.

The above and other objects, characteristic features and advantages of this invention will become more apparent when consideration is given to the following detailed description thereof with reference to the accompanying drawings, in which:

Figure 1 is an explanatory view illustrating a conventional storage devise as held in a state having a pin member fastened to a lock part of a cam member;

Figure 2 is an explanatory view illustrating the same storage device as held in a state having the pin member separated from the lock part of the cam member;

Figure 3(A) is an explanatory view illustrating the storage device formerly proposed by the present inventor and held in a state having a pin member fastened to a lock part of a cam member;

Figure 3(B) an explanatory view illustrating the same storage device as held in a state having the pin member separated from the lock part of the cam member;

Figure 4 is an explanatory view illustrating the same storage device as held in a state allowing an inertial force to act thereon;

Figure 5 is an explanatory view illustrating the same storage device as held in a state involving an overrun of the cam member;

Figure 6 is an explanatory view illustrating the same storage device as held in a state keeping the cam member lifted upwardly;

Figure 7 is an exploded perspective view showing the essential part of a storage device as the first embodiment of this invention;

Figure 8 is an enlarged perspective view showing only the relation of the cam member with a restraining wall;

Figure 9 is an explanatory view showing a state in which a regulating wall prevents the cam member from overrunning;

Figure 10 is an explanatory view showing the cam member of a storage device as the second embodiment of this invention;

Figure 11 is an explanatory view showing from the rear side the cam member used in a storage device as the third embodiment of this invention;

Figure 12 is a cross section of the essential part of the same storage devise as held in a state having the pin member fastened to the lock part of the cam member;

Figure 13 is a cross section of the essential part of the same storage device as held in a state having the pin member separated from the cam groove of the cam member;

Figure 14(A) is a side view showing another example of the cam member in the third embodiment; and

Figure 14(B) is a side view showing still another example of the cam member in the third embodiment.

Now, this invention will be described in detail hereinbelow with reference to the varying embodiments thereof shown in the accompanying drawings.

Similarly to the conventional push-open type storage devices described above, the storage device constituting the first embodiment of the present invention, as a prerequisite, comprises a storage cabinet B openably supported in a housing H disposed on the side of an instrument panel (not shown) and constantly kept biased in the opening direction thereof by the biasing force of a spring which will be described specifically hereinbelow, a cam member 1 disposed rotatably on the side of the housing H, and a pin member P disposed on the rear end side of the storage cabinet B as illustrated in Figure 7, whereby the storage cabinet B can be locked at its shut position inside the housing H against the biasing force of the spring by causing the pin member P to be fastened to the cam member 1 and the storage cabinet B can be moved automatically in the opening direction thereof from an opening of the housing H by the biasing force of the spring by causing the storage cabinet B in the locked state to be farther depressed into the housing H, thereby releasing the pin member P from the engagement with the cam member 1 and allowing the cam member 1 to rotate in the unlocking direction thereof.

The cam member 1 is a one-piece shaped article of synthetic resin. As illustrated in Figures 7 to 9, it has formed therein a cam groove 2 incorporating therein a guide inlet 3, a lock part 4 and a guide outlet 5 and is set in place rotatably round a fixing shaft part 7 on the side of the housing H. It has the lock part 4 and the guide outlet 5 formed as separated with a fair interval on one edge side thereof defining the cam groove 2 and has a stopper guide wall 6 formed in the approximate shape of the inverted letter of V on the other edge side opposite to the one edge side mentioned above and projected between the lock part 4 and the guide outlet 5. The lock part 4 fulfilling the role of fastening the pin member P is positioned outwardly at a fair distance from the leading end of the stopper guide wall 6.

In this respect, therefore, this storage devise in the process of being normally opened, similarly to the storage device formerly proposed by the present inventor, allows the pin member P to move in the direction of the guide outlet 5 of the cam groove 2 by making use of the gap intervening between the leading end of the stopper guide wall 6 and the one edge of the cam groove 2. The storage device, on exposure to the action of an inertial force, allows the pin member P to collide with an outer side edge 6a of the stopper guide wall 6 and prevents the pin member P from moving in the direction of the guide outlet 5 of the cam groove 2.

In Figure 7, reference numeral 10 stands for a restraining wall for limiting the position to which the cam member 1 is biased by a torsion spring 8, numeral 11 for a fastening wall adapted to fasten the end of the torsion spring 8 in cooperation with an arm 1b of the cam member 1, and numeral 12 for a constant-pressure spring for constantly keeping the storage cabinet B biased in the opening direction thereof. This constant-pressure spring 12 is enabled to function as means for biasing the storage cabinet B by winding the spring 12 round a winding shaft 13 in the contracting direction thereof, fixing the winding shaft 13 to the rear end wall of the storage cabinet B through a retaining part 14, and fixing a free end 12a of the spring 12 to the bottom surface close to the opening of the housing H as by means of screws (not shown).

Besides the construction described above, the first embodiment further comprises, as illustrated in Figure 8, a regulating wall 15 which is adapted to limit the amount of rotation of the cam member 1 in a direction opposite to the biasing direction, namely the amount of rotation in the direction of causing the pin member P to separate from the guide inlet 3 of the cam groove 2, and is disposed on the side opposite to the restraining wall 10 fulfilling the role of limiting the position to which the cam member 1 is biased by the torsion spring 8. Owing to the presence of the the regulating wall 15 at the position described above, even when an inertial force G1 of an unimaginably large magnitude or an inertial force G2 generated in an oblique direction as illustrated in Figure 9, the storage devise is enabled to limit the amount of rotation of the cam member 1 in the reverse direction to the smallest possible extent and prevent the pin member P from being readily separating from the guide inlet 3 of the cam groove 2.

The first embodiment is fated to pose a problem of selection of the position at which the amount of rotation of the cam member 1 is to be limited. Since the cam member 1 must be rotated in a direction opposite to the biasing direction of the torsion spring 8 and the pin member P guided into the cam groove 2 through the guide inlet 3 for the purpose of locking the storage cabinet B at its shut

position, the leading end of an outer guide surface 1a of the cam member 1 defining the guide inlet 3 is not allowed to protrude outwardly (to the lower side in the bearings of Figure 9) from the path L of motion of the pin member P.

For the sake of limiting the amount of rotation of the cam member 1 by means of the regulating wall 15, therefore, it is necessary to have the regulating wall 15 disposed on side of the housing H as illustrated in Figure 7 so that the cam member will be allowed to rotate in the irreducible minimum amount in the opposite direction mentioned above and, as a result, the leading end of the outer guide surface 1a will assume the nearest position to the path L on the inside (on the upper side in the bearings of Figure 9) of the path L along which the pin member P is smoothly guided into the guide inlet 3 of the cam groove 2.

In the normal use of the storage device of the first embodiment, therefore, when the storage cabinet B is depressed into the housing H against the biasing force of the constant-pressure spring 12, the pin member P automatically fastens on the lock part 4 of the cam groove 2 positioned outside and causes the storage cabinet B to be locked at its shut position inside the housing H against the biasing force of the constant-pressure spring 12 in the same manner as described above. When the storage cabinet B in the locked state is farther depressed into the housing H, it can move automatically in the opening direction thereof from the opening of the housing H by virtue of the biasing foece of the constant-pressure spring 12 because the pin member P is allowed to separate from the cam groove 2 of the cam member 1 via the guide outlet 5.

When the inertial force G1 of unimaginably large magnitude or the inertial force G2 generated in an oblique direction acts on the storage cabinet B in the locked state at the shut position thereof, the cam member 1 in the storage device of the first embodiment rotates in a direction opposite to the direction in which the torsion spring 8 biases the storage cabinet B. Owing to the presence of the regulating wall 15, however, the cam member 1 is no longer suffered to collide against the regulating wall 15 and produce an overrun but is enabled to rotate quickly again in the biasing direction by virtue of the biasing force of the torsion spring 8 and receive infallibly the pin member P which is tending to retract by dint of the biasing force of the constant-pressure spring 12. As a result, the storage devise can be expected to manifest the function of safety to a greater certainty because the otherwise possible accidental separation of the pin member P from the guide inlet 3 of the cam groove 2 of the cam member 1 can be effectively prevented.

Now, the storage devise of the second embodiment according to this invention will be described below. While the storage device of the second embodiment has been developed with the same object as the first embodiment, it differs from the storage device of the first embodiment in respect that, in place of the regulating wall 15, a balance adjusting part 16 is integrally extended from the rear end of the cam member 1 as shown in Figure 10 so that the center of gravity of the cam member 1 will coincide with the fixing shaft 7 intended to serve as the center of rotation.

Incidentally, as respects the balance adjusting part 16 which plays the role of shifting the center of gravity, it is given a desired weight by suitably setting the shape, area, wall thickness, etc. as depicted in Figure 10. Optionally, the object of the provision of this balance adjusting part 16 may be attained by decreasing the area and wall thickness of this part and providing this part with a separately shaped weight.

When the inertial force G1 of unimaginably large magnitude or the inertial force G2 produced in an oblique direction acts on the storage device of the second embodiment, therefore, the otherwise possible overrun of the cam member 1 in the reverse direction can be prevented because the center of gravity of the cam member 1 falls on the fixing shaft 7. Thus, the possibility of the cam member 1 accidentally separating from the guide inlet 3 of the cam groove 2 and the possiblity of the storage cabinet B accidentally moving in the opening direction thereof from the opening of the housing H can be effectively prevented.

Now, the storage device according to the third embodiment of this invention will be described below. In contrast to the first and second embodiments which have been developed mainly in due consideration of the impact exerted to bear on the front side of an automobile body, the third embodiment has been developed in consideration of the impact exerted to bear on the rear side of an automobile body besides that affecting the front side.

When an automobile carrying the storage device receives an impact in the front side thereof, the inertial force which is consequently generated simply causes the storage cabinet B to advance together with the pin member P and does not impose a very large load on the cam member 1 per se. When the automobile has some other vehicle collide therewith from behind or when the automobile in the process of driving backward collides with an obstacle, however, the housing H is made to move forward together with the automobile body, and the storage cabinet B supported in the housing H tends to remain at its existent position as aided by the biasing force of the constant-

pressure spring 12. As a result, the same phenomenon of separation as is encountered when the housing H and the storage cabinet B are moved in mutually opposite directions arises to impose a very large load particularly on the cam member 1. This adverse phenomenon has motivated the development of the third embodiment of this invention.

By faithfully observing the principle of the cam member 1 of the first embodiment, therefore, the third embodiment adopts a construction such that the strength of the cam member 1 on the side of the lock part 4 thereof is positively increased by forming a part 17 of increased wall thickness on the lower surface of the lock part 4 and its immediate vicinity of the cam groove 2 of the cam member 1 throughout a fixed area as illustrated in Figure 11.

In the storage device of the third embodiment as in that of either of the preceding embodiments, therefore, when the storage cabinet B is depressed into the housing H against the biasing force of the constant-pressure spring 12, the pin member P on the storage cabinet B side fastens on the lock part 4 of the cam groove 2 reinforced with the part 17 of increased wall thickness and locks the storage cabinet B at the shut position thereof inside the housing H against the biasing force as illustrated in Figure 12. When the storage cabinet B in the locked state is farther depressed into the housing H, the pin member P separated from the cam groove 2 of the cam member 1 via the guide outlet 5 as illustrated in Figure 13. As a result, the storage cabinet B is automatically moved in the opening direction thereof from the opening of the housing H by virtue of the biasing force of the constant-pressure spring 12.

When the automobile carrying the storage devise has some other vehicle collide therewith from behind or when the automobile in the process of driving backward collides with an obstruct while the storage cabinet B is in the locked state at the shut position thereof, the impact which is consequently generated induces the same phenomenon of separation as is encountered when the housing H and the storage cabinet are moved in the mutually opposite directions. Since the lock part 4 playing the role of fastening the pin member P integrally contains partly therein the part 17 of increased wall thickness, however, the possibility of the lock part 4 or the immediate vicinity thereof being broken under a large load exerted thereon is absolutely nil. Further, since the shape of the increased wall thickness of the lock part 4 ensures ample engagement of the pin member P with the lock part 4 over a fairly large width, the possibility of the pin member P being tilted by an increase in the apparent rigidity of the two components, i.e. the pin member P and the lock part 4, to the extent of releasing the leading end of the cam member 1 upwardly can be effectively prevented.

In the third embodiment, therefore, the storage cabinet B can be infallibly retained at the shut position thereof inside the housing H and prevented from accidentally thrusting out of the housing H even when the automobile is exposed to a strong impact exerted not only on the front side but also on the rear side.

When the lock part 4 is to be given an increased wall thickness as contemplated by the third embodiment, the part 17 having the wall thickness increased as required is formed on the lower surface side as illustrated in Figure 11. The location of this part 17 does not need to be limited to the position just mentioned. For example., the part 17 having the wall thickness increased as required may be imparted to the upper surface side of the lock part 4 of its immediate vicinity as illustrated in Figure 14(A) or the part 17 having the wall thickness increased as required may be imparted to both the upper and lower surfaces as illustrated in Figure 14(B). Naturally, the part 17 of increased wall thickness can be expected to produce the same operating effect irrespective of the relative position thereof.

Particularly in the construction in which the part 17 of wall thickness increased as required is imparted exclusively to the lower surface side as illustrated in Figure 11, the depth of the pin member P reaching the vicinity of the root thereof is allowed to contact the part 17 of increased wall thickness on the lock part 4 side. Owing to this state of ample contact, the construction is at an advantage in effectively precluding the pin member P from tilting and preventing the leading end of the cam member 1 from slipping upward with enhanced certainty.

It is fully conceivable to use exclusively the construction of the third embodiment. The storage device can manifest its safety function to a greater extent by suitably combining the construction of the third embodiment with that of the first or second embodiment.

This invention makes full use of the advantages of the present inventor's formerly proposed storage device and, at the same time, makes up for the defects thereof by the provision of a very simple construction as described above. The storage device of this invention, therefore, can be expected to produce a reliable safety function to cope with the impact exerted on the rear side as well as on the front side of the automobile.

Claims

1. A storage device with a safety function and for use in an automobile, comprising:

a storage cabinet (B) openably supported in a housing (H) having an opening;

a spring (12) provided between the storage cabinet and the housing for constantly biasing the storage cabinet in an opening direction thereof;

a cam member (1) rotatably disposed on the side of the housing and provided on an outside thereof with a guide surface (1a) and on an inside thereof with a cam groove (2) which has a guide inlet (3), a lock part (4) and a guide outlet (5); and

a pin member (P) disposed on the side of the storage cabinet for moving along the guide surface of the cam member, entering the guide inlet of the cam groove and engaging with the lock part of the cam groove to lock the storage cabinet at a shut position thereof inside the housing against the biasing force of the spring when a first depressing force is applied to the storage cabinet and for moving inside the cam groove to be released from the engagement with the lock part of the cam groove and brought to the guide outlet of the cam groove, therey moving the storage cabinet automatically in the opening direction thereof through the opening of the housing when a second depressing force is applied for moving the locked storage cabinet further into the housing; the lock part and the guide outlet of the cam groove being separated from each other on one edge side of the cam member defining the cam groove;

the other edge side of the cam member opposite to the one edge side being provided integrally with a projecting stopper guide wall (6) at a position between the lock part and the guide outlet of the cam groove so that the lock part of the cam groove is positioned outwardly from the stopper guide wall of the cam groove;

whereby the pin member is enabled to collide with an outer edge (6a) of the stopper guide wall of the cam member and prevent the storage cabinet from being thrust out of the housing when the storage device is exposed to a large inertial force;

said storage device being characterized in that a regulating wall (15) is provided within the housing (H) at a position capable of limiting the amount of rotation of the cam member (1) when the cam member (1) happens to rotate from the guide inlet (3) of the cam groove (2) in the direction of releasing the pin member (P).

2. A storage device with a safety function and for use in an automobile, comprising:

a storage cabinet (B) openably supported in a housing (H) having an opening;

a spring (12) provided between the storage cabinet and the housing for constantly biasing the storage cabinet in an opening direction thereof;

a cam member (1) rotatably disposed on the side of the housing and provided on an outside thereof with a guide surface (1a) and on an inside thereof with a cam groove (2) which has a guide inlet (3), a lock part (4) and a guide outlet (5); and

a pin member (P) disposed on the side of the storage cabinet for moving along the guide surface of the cam member, entering the guide inlet of the cam groove and engaging with the lock part of the cam groove to lock the storage cabinet at a shut position thereof inside the housing against the biasing force of the spring when a first depressing force is applied to the storage cabinet and for moving inside the cam groove to be released from the engagement with the lock part of the cam groove and brought to the guide outlet of the cam groove, therey moving the storage cabinet automatically in the opening direction thereof through the opening of the housing when a second depressing force is applied for moving the locked storage cabinet further into the housing; the lock part and the guide outlet of the cam groove being separated from each other on one edge side of the cam member defining the cam groove;

the other edge side of the cam member opposite to the one edge side being provided integrally with a projecting stopper guide wall (6) at a position between the lock part and the guide outlet of the cam groove so that the lock part of the cam groove is positioned outwardly from the stopper guide wall of the cam groove;

whereby the pin member is enabled to collide with an outer edge (6a) of the stopper guide wall of the cam member and prevent the storage cabinet from being thrust out of the housing when the storage device is exposed to a large inertial force;

said storage device being characterized in that the cam member (1) has an adjusting part (16) for causing the center of gravity of the cam member (1) and the axis of rotation of the cam member (1) to coincide with each other.

3. A storage devise with a safety function and for use in an automobile, comprising:

a storage cabinet (B) openably supported in a housing (H) having an opening;

a spring (12) provided between the storage cabinet and the housing for constantly biasing the storage cabinet in an opening direction thereof;

a cam member (1) rotatably disposed on the side of the housing and provided on an outside thereof with a guide surface (1a) and on an inside thereof with a cam groove (2) which has a guide inlet (3), a lock part (4) and a guide outlet (5); and

a pin member (P) disposed on the side of the storage cabinet for moving along the guide surface of the cam member, entering the guide inlet of the cam groove and engaging with the lock part of the cam groove to lock the storage cabinet at a shut position thereof inside the housing against the biasing force of the spring when a first depressing force is applied to the storage cabinet and for moving inside the cam groove to be released from the engagement with the lock part of the cam groove and brought to the guide outlet of the cam groove, therey moving the storage cabinet automatically in the opening direction thereof through the opening of the housing when a second depressing force is applied for moving the locked storage cabinet further into the housing; the lock part and the guide outlet of the cam groove being separated from each other on one edge side of the cam member defining the cam groove;

the other edge side of the cam member opposite to the one edge side being provided integrally with a projecting stopper guide wall (6) at a position between the lock part and the guide outlet of the cam groove so that the lock part of the cam groove is positioned outwardly from the stopper guide wall of the cam groove;

whereby the pin member is enabled to collide with an outer edge (6a) of the stopper guide wall of the cam member and prevent the storage cabinet from being thrust out of the housing when the storage device is exposed to a large inertial force;

said storage device being characterized in that the cam member (1) is thicker at the lock part (4) other than the remaining part of the cam member (1).

4. A storage device according to any one of claims 1 and 2, characterized in that the cam member (1) is thicker at the lock part (4) other than the remaining part of the cam member (1).

FIG.1

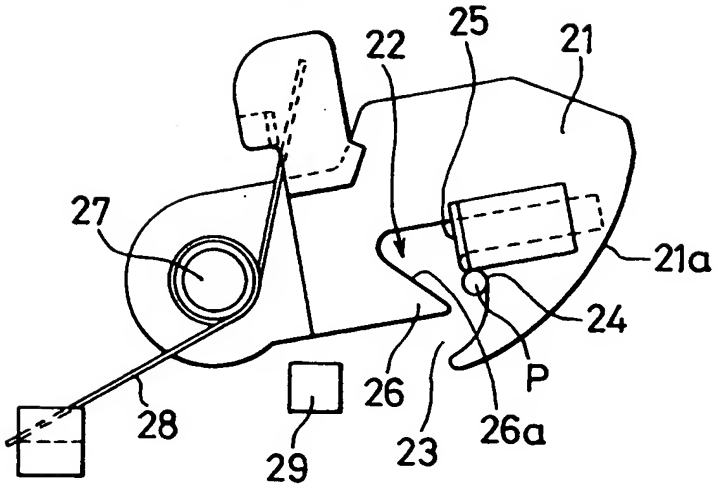
22
25
21
27
21a
24
P
26
26a
28
29
23

FIG.2

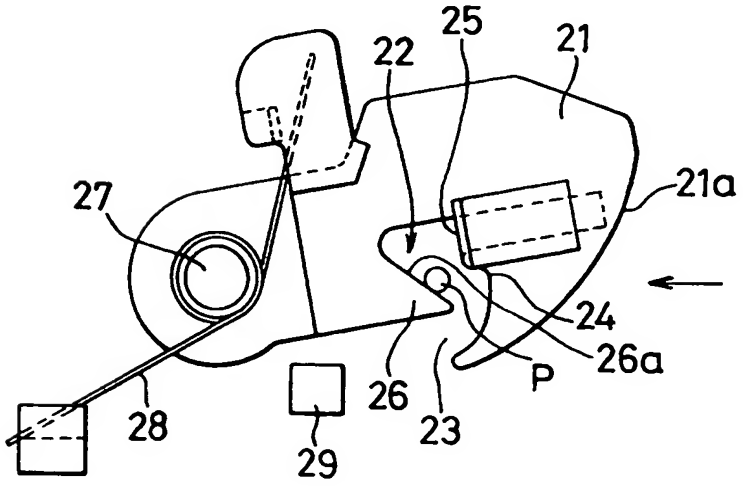
25
22
21
27
21a
24
26a
P
26
28
29
23

FIG. 3(A)

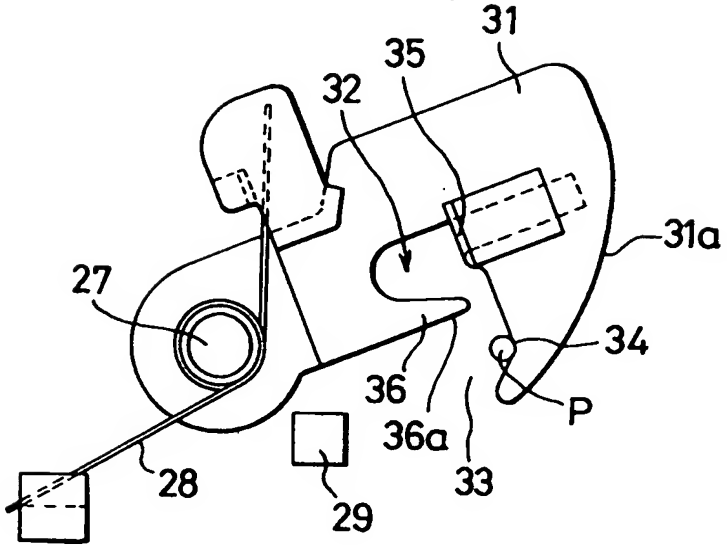
31
35
32
31a
27
34
36
P
36a
33
28
29

FIG. 3(B)

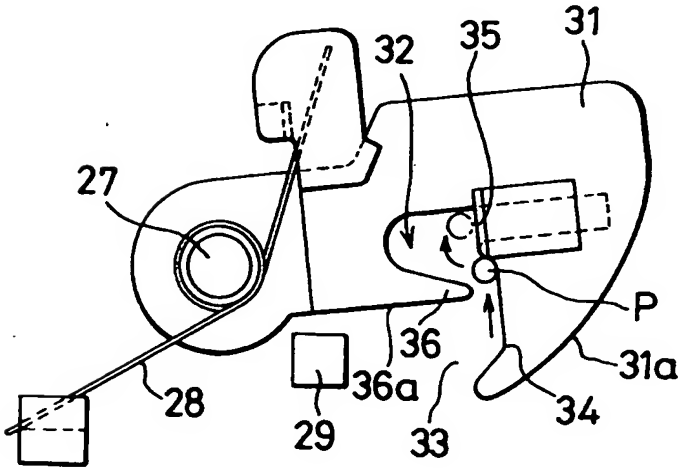
32
35
31
27
P
36
31a
36a
34
28
29
33

FIG.4

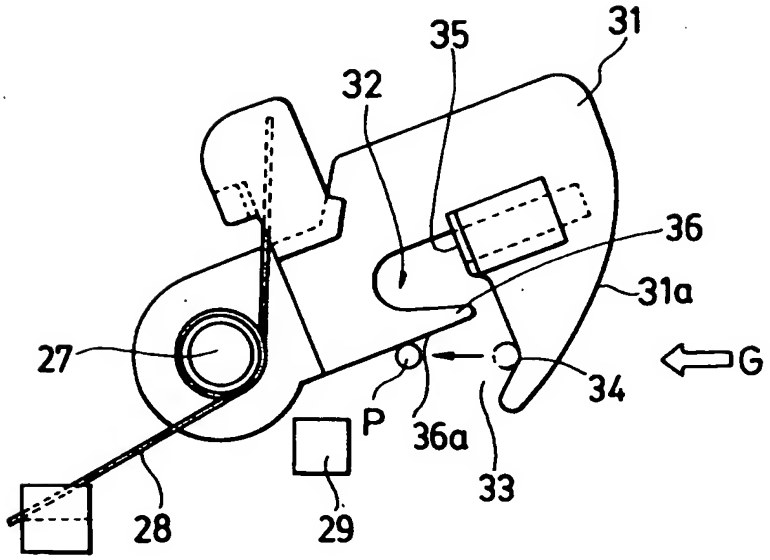
35
31
32
36
31a
27
G
34
P
36a
33
28
29

FIG.5

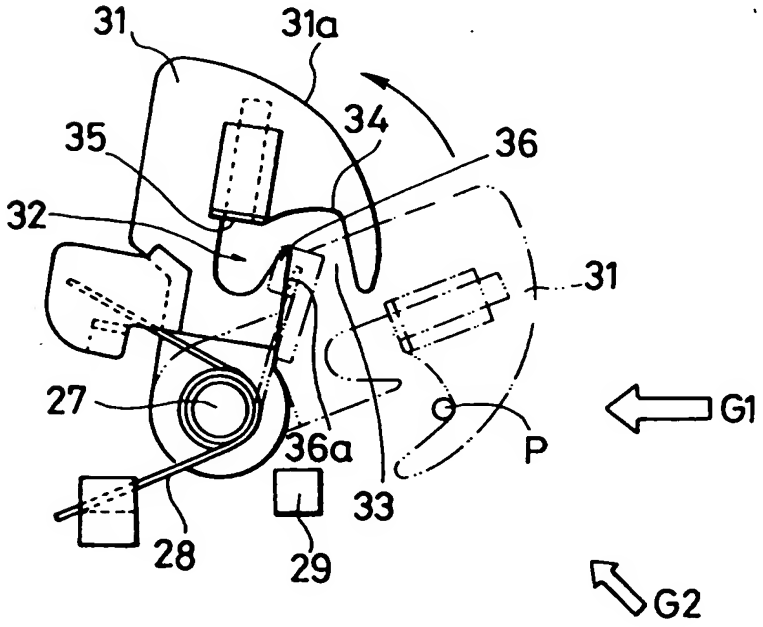
31
31a
34
35
36
32
31
27
G1
36a
P
33
28
29
G2

FIG. 7

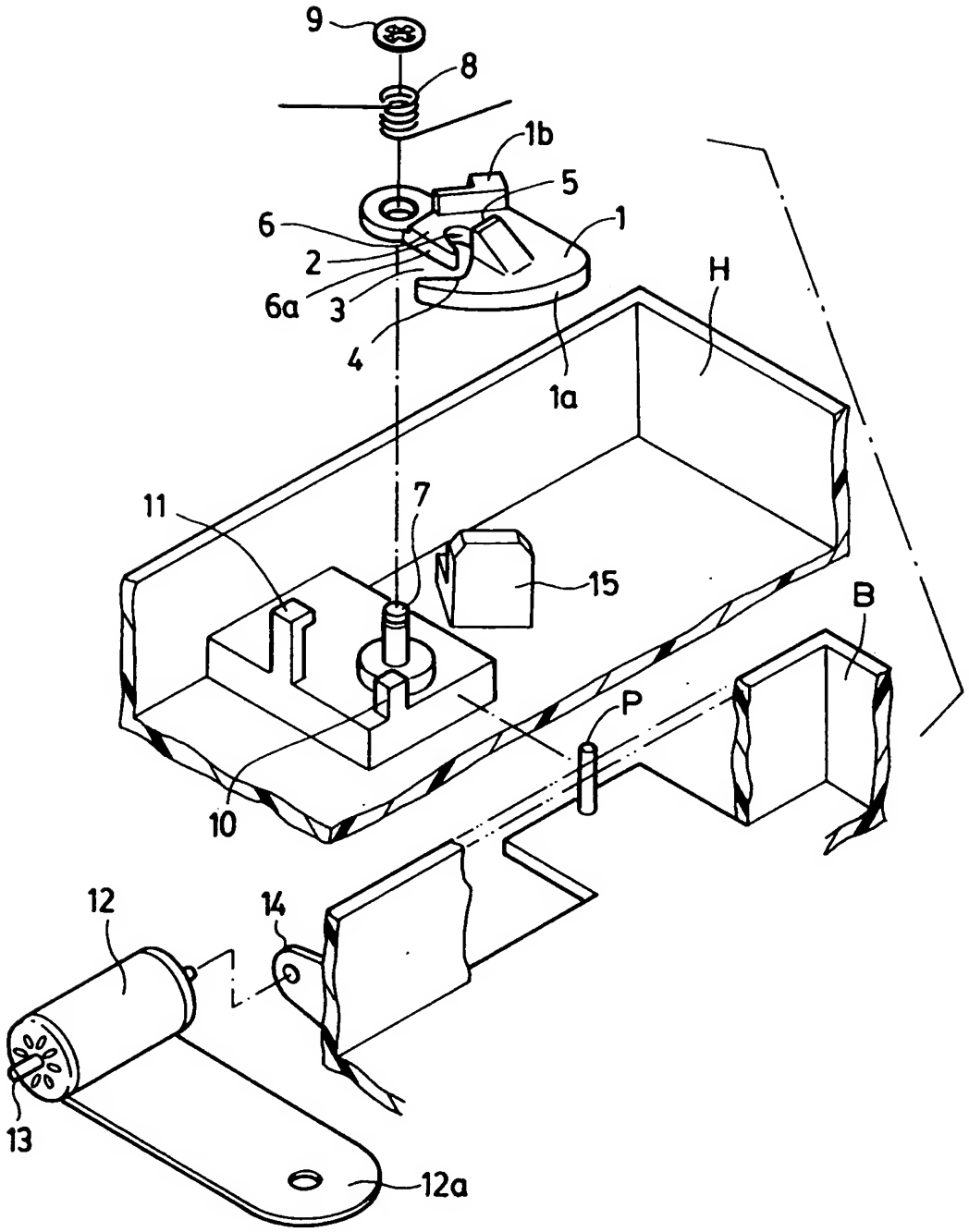

FIG.6

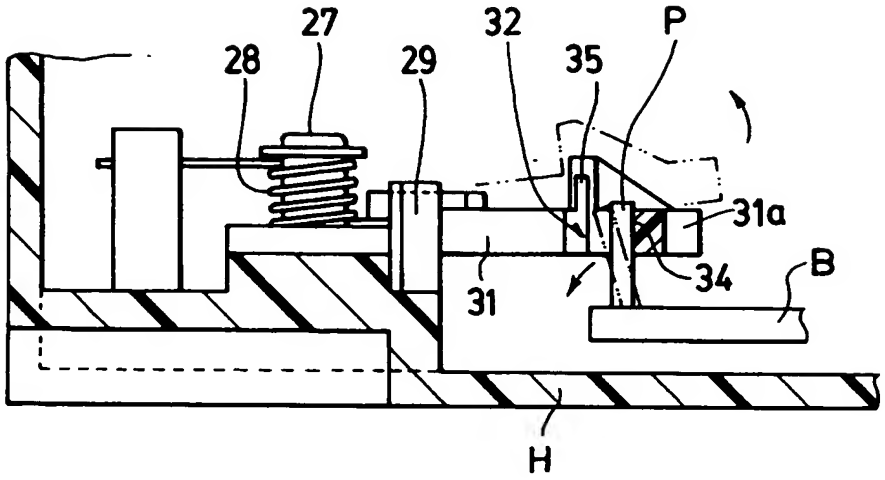

FIG.8

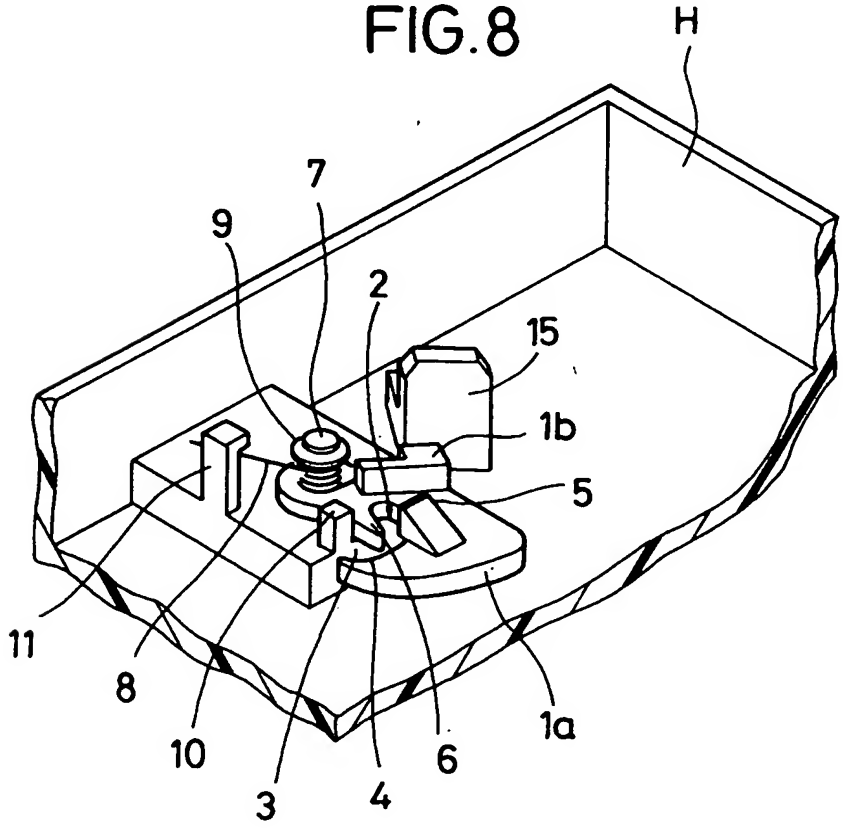

FIG.9

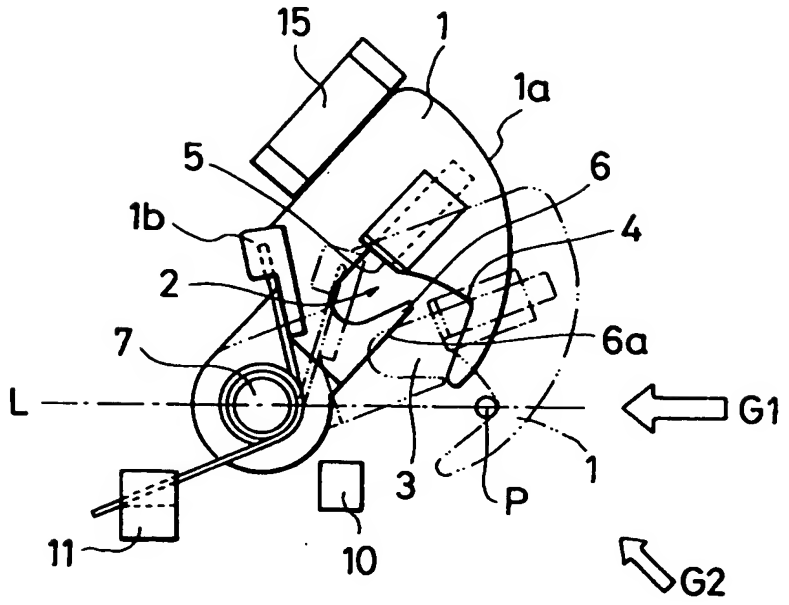
15
1
1a
5
6
1b
4
2
7
6a
L
G1
3
P
1
11
10
G2

FIG.10

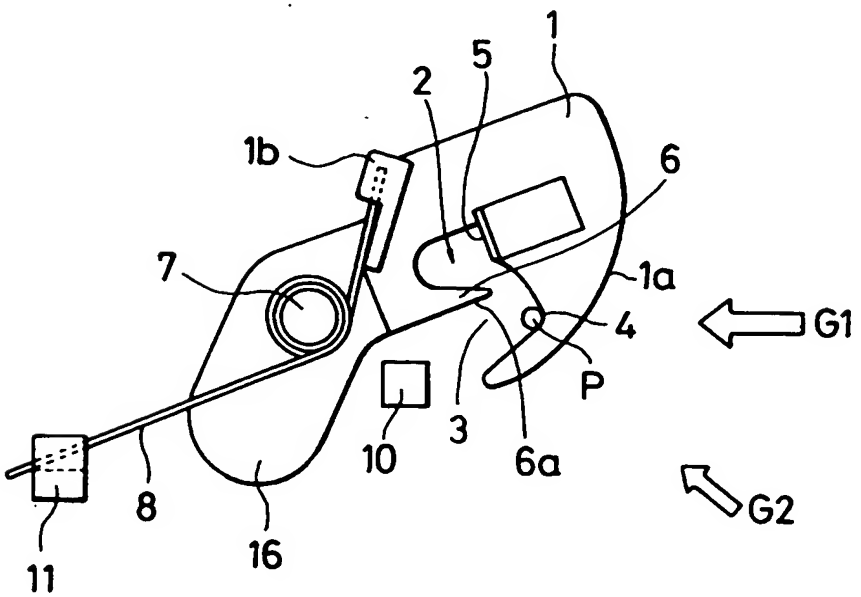
1
5
2
1b
6
7
1a
4
G1
P
10
3
6a
G2
8
16
11

FIG.11

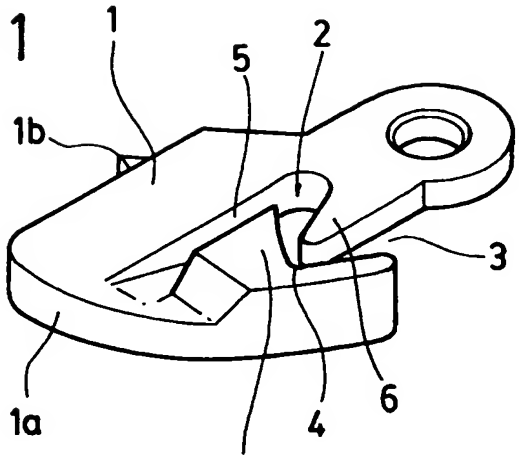

FIG.12

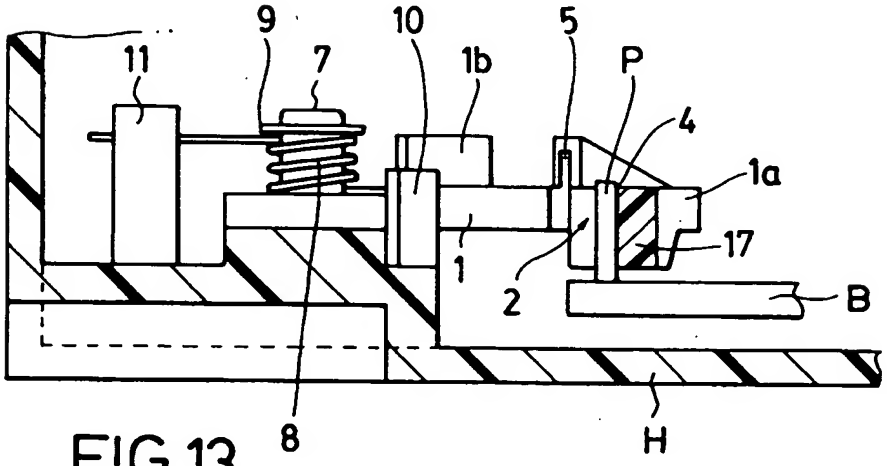

FIG.13

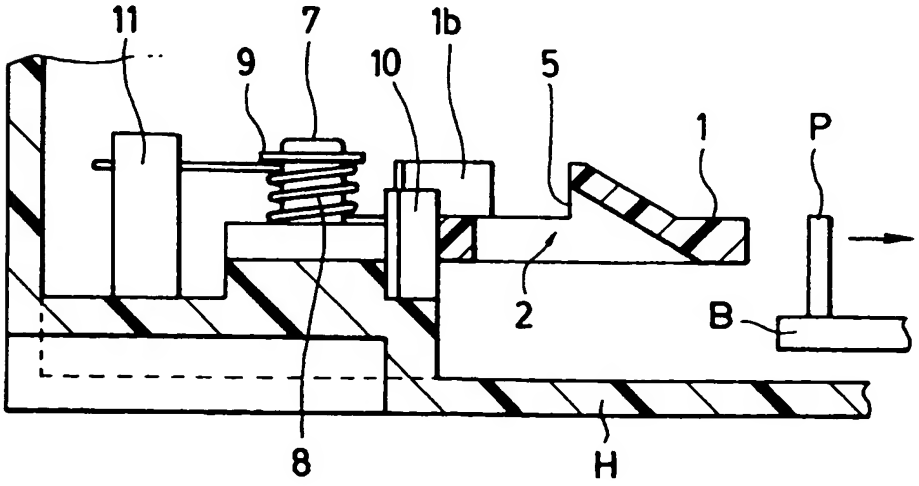

FIG.14(A)

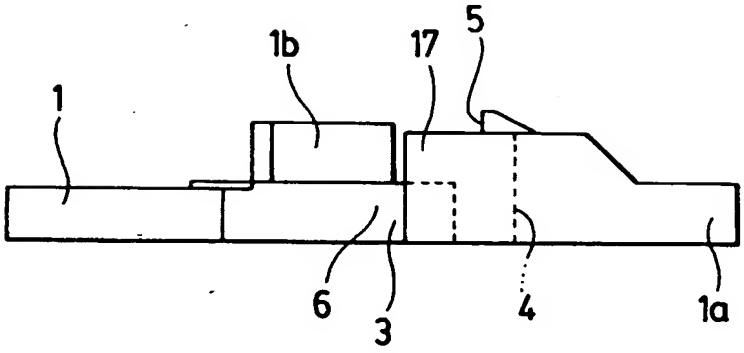

FIG.14(B)